FIELD IMPLEMENTATION PLAN
FOR
REMOVAL OF THE DISCOVERED CONTAINER
AT TRENCH 1 (IHSS 108)

RF/RMRS-99-310

Rocky Mountain Remediation Services, L.L.C.

January 1999

Revision 0

ADMINISTRATIVE INFORMATION

Site	Rocky Flats Environmental Technology Site, Golden Colorado
Project Name	Source Removal at Trench 1 - IHSS 103
Date Prepared	January 1999

Approvals

I have read and approved this Field Implementation Plan with respect to project procedures and the planned implementation of the scope of work

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LIST OF ACRONYMS

AHA	Activity Hazard Analysis
ALARA	As Low As Reasonably Achievable
CA	Contamination Area
CAM	Continuous Air Monitor
COOP	Conduct of Operations
DOT	Department of Transportation
DOE	Department of Energy
ER	Environmental Restoration
FID	Flame Ionization Detector
FIDLER	Field Instrument for the Detection of Low Energy Radiation
FIP	Field Implementation Plan
HASP	Health and Safety Plan
HCA	High Contamination Area
HEPA	High Efficiency Particulate Air
IDLH	Immediate Danger to Life and Health
IHSS	Individual Hazardous Substance Site
IWCP	Integrated Work Control Package
K-H	Kaiser-Hill Company, Inc
OVA	Organic Vapor Analyzer
PAM	Proposed Action Memorandum
PID	Photoionization Detector
PPE	Personal Protective Equipment
QA	Quality Assurance
QC	Quality Control
RBA	Radiological Buffer Area
RFETS	Rocky Flats Environmental Technology Site
RMA	Radioactive Material Area
RMRS	Rocky Mountain Remediation Services, L L C
SAP	Sampling Analysis Plan
SIP	Sampling and Inerting Pad
SCBA	Self Contained Breathing Apparatus
VOCs	Volatile Organic Compounds

1.0 INTRODUCTION

This Field Implementation Plan (FIP) describes the planned activities to remove a two- to five-gallon metal container discovered in the Trench 1 - Individual Hazardous Substance Site (IHSS) 108 excavation on December 18, 1998 (see Figure 1-1) The metal container was exposed by heavy equipment on the north wall of the trench excavation during backfill operations being performed to complete the Trench 1 - IHSS 108 Source Removal Project Background information on the Trench 1 Source Removal Project is presented in the *Final Proposed Action Memorandum (PAM) for the Source Removal at Trench 1, IHSS 108* (RMRS, 1998a)

Because of the potential for the presence of pyrophoric radioactive materials and unknown materials, all container removal actions will be performed using fire controls and health and safety requirements specified for the Trench 1 Source Removal Project All work will be conducted in accordance with the applicable work control documents (or pertinent sections and subsections of applicable work control documents) developed for the Trench 1 Source Removal Project In addition to this FIP, the work control documents include the following

- *Final Proposed Action Memorandum (PAM) for the Source Removal at Trench 1, IHSS 108*, (RMRS, 1998a),
- *Site Specific Health and Safety Plan (HASP) for the Source Removal at Trench 1 Site, IHSS 108*, (RMRS, 1998b),
- *Sampling Analysis Plan (SAP) to Support the Source Removal at the Trench T-1 Site, IHSS 108*, (RMRS, 1998c),
- *Safety Analysis for Individual Hazardous Substance Site (IHSS) 108, Trench 1 (T-1) Source Removal Project,* (RMRS, 1999a),
- *Starmet Sampling and Analysis Plan for the Source Removal at Trench 1 IHSS 108*, (Starmet, 1998),
- *Integrated Work Control Package (IWCP) No T0095380*
- *Department of Energy (DOE) Orders*
- *Rocky Flats Environmental Technology Site (RFETS) policies and procedures, and*
- *RMRS Environmental Restoration (ER) Operations Orders*

Conduct of Operations (COOP) will be conducted in a manner consistent with RFETS goals, objectives, and approved procedures in accordance with DOE Order 5480 19 Implementation of COOP is

summarized in Appendix A The container removal tasks and operations described below will be performed under the *Trench 1 Quality Assurance Implementation Plan* (Appendix B)

2 0 BACKGROUND

During backfill operations for Trench 1, a newly discovered metal container was observed approximately three feet below ground surface at approximately the 162-foot mark measured from the west extent of the excavation (see Figure 1-2) Only a portion of the upper half of the container, including a portion of the rim of the lid, was observed The container was in an upright position and appeared to be intact and undamaged when exposed The metal container resembles similar five-gallon cans previously exhumed during the Trench 1 Source Removal Project and is therefore expected to contain potentially pyrophoric radioactive material Direct radioactivity measurements on the container indicated 55,182 counts per minute (cpm) on the Field Instrument for Detection of Low Energy Radiation (FIDLER) No removable radioactivity on the container exterior was observed The area around the container has been posted as a Radioactive Material Area (RMA)

3.0 SCOPE OF WORK

The scope of this project involves conducting a geophysical survey of the Trench 1 excavation perimeter and the removal of the known buried container and any containers, debris, and related waste (including potentially contaminated soil) identified near the excavation boundary, based on the survey results The materials encountered will be manually excavated, then sampled, inerted, and packaged for appropriate off-site disposal These activities will be performed inside a small temporary enclosure within the existing (Sprung Instant Structure) weather shelter as described below The primary activities included in the scope of work are the following

- Conducting a geophysical survey around the perimeter of the Trench 1 excavation,
- Preparing the site for container removal,
- Physical removal of container, debris, and related waste,
- Sampling of container contents, debris, as necessary,

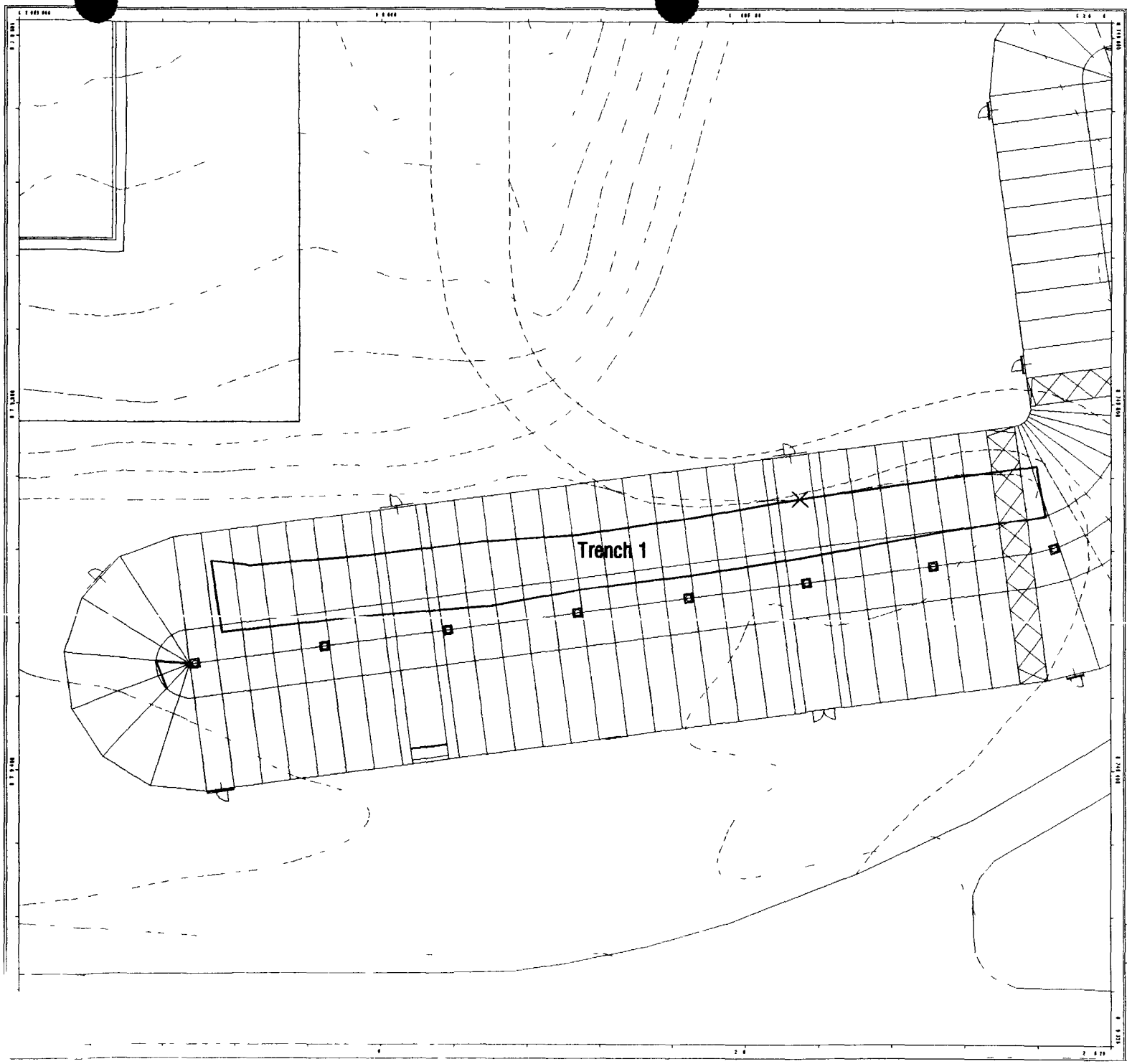

Figure 1-2
Location of Discovered Container at Trench 1 Site

EXPLANATION

- Location of 5-gal Container
- Excavation Boundary

Standard Map Features

- Buildings and other structures
- Lakes and ponds
- Streams ditches or other drainage features
- Fences and other barriers
- Paved roads
- Dirt roads
- 2-Foot Contours

DATA SOURCE:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSI, Las Vegas. Digitized from the orthophotographs, 1/96

Scale = 1 : 450
1 inch represents approximately 38 feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U S Department of Energy
Rocky Flats Environmental Technology Site

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- Inerting potentially pyrophoric material, as necessary,
- Packaging of container/contents, debris, and related waste (e g , surrounding soil), as necessary, and
- Sampling of soil surrounding container, debris, as necessary

Radiological air sampling and environmental air monitoring will be performed within the weather shelter during the removal activities as described in Section 3 6

Prior to removal of the metal container from the north excavation wall, a geophysical survey will be performed above the known container location, as well as around the entire excavation perimeter If the survey results indicate definitive evidence of the presence of additional containers in close proximity to the excavation side-walls, the container removal strategy and operations as described in this FIP will be utilized as appropriate on those containers However, depending upon the location, and number and depth of additional containers (if any), it may be necessary to perform operations similar to those used during the Trench 1 Source Removal Project or revise this FIP accordingly

3 1 Geophysical Survey of Excavation Boundary

Prior to removing the known buried two- to five-gallon metal container, a comprehensive geophysical survey will be conducted around the perimeter of the Trench 1 excavation The survey will extend outward from the excavation walls a maximum of six feet from all four sides of the excavation The survey will be capable of detecting a five-gallon metal object at a minimum depth of six feet under typical field conditions

Results from this survey will provide data to evaluate if other metal containers are located in close proximity to the excavation boundary, and if present, their approximate depth below ground surface The survey results will also provide supplemental information to help verify that all materials previously buried in Trench 1 have been removed from the trench

3.2 Site Preparation

In order to facilitate safe and efficient handling of any container or materials during excavation activities, the floor of the trench was raised approximately one foot to bring it level with the bottom of the

discovered container, and to bring the trench depth to four feet or less to allow for personnel access into the excavation Soil was transferred with a front loader from the existing Trench 1 (less than 5,000 cpm) stockpile to backfill the excavation to four feet or less This action is intended to significantly reduce hazards associated with handling of any container as it is being removed from the excavation side-wall This limited backfill activity was conducted in a manner to maintain the integrity of the soil around the container, and of the container itself

To allow for safe excavation and exposure of the buried container, a metal barrier was placed against the north excavation wall near the metal container location The barrier will prevent the container from tumbling or rolling out of the excavation side-wall

The existing (Sprung Instant Structure) weather shelter was radiologically surveyed and found clean after the original Trench 1 excavation scope of work was completed The radiological survey for the weather shelter took approximately 800 man-hours to complete In order to prevent potential contamination of the weather shelter during the removal operations, a small temporary enclosure will be constructed over the excavation work area

The enclosure will be equipped with High Efficiency Particulate Air (HEPA) filtered ventilation with an air mover sufficient to maintain a negative pressure inside the enclosure The temporary enclosure will be built of lightweight non-combustible materials (e g , fire-retardant plastic sheeting and steel tubing) so it can be moved to other locations within the weather shelter in the event that additional containers are identified through the geophysical survey The enclosure shall be of a size to hold at least three personnel wearing Self-contained Breathing Apparatus (SCBA), a waste package, sampling and monitoring equipment, fire extinguishing/suppression materials, and allow enough space to maneuver the waste package and personnel (approximately 16 feet by 16 feet) The enclosure frame will be inserted approximately six inches to one foot into the ground for stabilization Enough plastic at the bottom of the frame will allow the bottom to be covered with and anchored in the soil A section of the enclosure may be made with clear plastic to allow viewing of the work in progress A vestibule area, about six feet by six feet, with overlapping flap doors will be attached to the enclosure for removal of personal protective equipment (PPE) and release of personnel and equipment

For radiological control purposes, the main enclosure work area will be posted as a High Contamination Area (HCA) The vestibule will be posted as a Contamination Area (CA) and the area outside the vestibule as a Radiological Buffer Area (RBA) Work within the enclosure HCA and CA will be performed in Level B protective equipment, or as designated in the existing Trench 1 HASP (RMRS, 1998b) RFETS Radiological Control Technicians and RFETS trade personnel will construct the enclosure The enclosure will be inspected by a Radiological Control Technician Technical Supervisor when completed, prior to use

3 3 Container and Material Removal

This section describes the approach for excavating any container or other material identified for removal through the geophysical survey investigation A step-by-step description for removal and management of the container is presented in Appendix C

3 3 1 Container Removal

Excavation of the two- to five-gallon metal container will be performed manually using hand shovels Initially, manual excavation will proceed from the top of the container to remove only enough soil to expose the container lid and vertical surface immediately below the lid Once this upper portion of the container is exposed, and prior to removing from the excavation side-wall, it will be pierced to vent potential hydrogen gas accumulation within the container Venting will be performed manually utilizing a small punch made of non-sparking material attached to an 8 to 10-foot length of pipe From a safe distance (approximately 10 feet) the non-sparking punch will be positioned on the exposed vertical surface of the container beneath the rim of the container lid to make a small hole by tapping with a hammer

After venting, the container will be heat-tested using a hand-held infrared thermometer to measure the temperature of the container contents and detect potential temperature increase resulting from oxidation of pyrophoric material Appropriate fire control and fire suppression agents will be located within the enclosure immediately adjacent to the work area and will be used on the container if the heat test is positive Procedures for performing the heat test and actions to be taken if elevated temperatures are

detected are described in the ER *Operations Order OO-T1-09, Temperature Measurements of Depleted Uranium Using Infrared Heat Gun*

If the heat test results indicate it is safe to do so, additional soil may be removed from around the container (if necessary) and a radiation dose survey will be performed using a beta/gamma radiation detector If the radiation survey determines that the container contents has a gamma or beta exposure rate of greater than 5 millirem per hour (mrem/hr) at 30 centimeters, work will temporarily stop to evaluate hazards and controls and the work area will be posted as "Radiation Area " The container and its contents will then be field screened for radiological contamination, volatile organic compounds (VOCs), and combustible gases using instrumentation listed in Table 3 1 Note that the field characterization methods and instrumentation presented in Table 3 1 are consistent with those used during the Trench 1 excavation operations All field characterization measurements will be recorded

At the time the two- to five-gallon metal container was discovered on December 18, 1998, the exposed upper portion of the container was undamaged and appeared to be intact If it is determined that the container is not intact when fully exposed, the material encountered will undergo the same initial field screening as described above for an intact container before being handled

If the container is intact and field screening measurements indicate the container is stable, it will be wrapped in plastic sheeting or manually placed into a plastic bag At this time the lid will be removed to visually inspect the container contents to determine if sampling is required If the contents are identified as the same material encountered in drums removed during excavation of Trench 1, then sampling of the contents will not be required If the container contents cannot be identified, sampling will be performed as described in Subsection 3 4 Once sampling is complete, if required, the container in the plastic bag will be placed into an appropriate waste package (e g , Department of Transportation (DOT) 7A Type A overpack drum or DOT 7A Type A metal box) The container contents will then be inerted with sand or soil

Table 3.1
Initial Waste Characterization Summary

Waste Type	Initial Characterization Type/Instrumentation[1,2,3]
Container (intact or non-intact) or Unknown Material	• Heat testing – Newport Model OS521 Handheld Infrared Thermometer • Radiation Survey – Eberline Model RO-20 Beta/Gamma Radiation Detector • Combustible gases - Mine Safety Appliances Model Passport • VOCs - Foxboro Model TVA 1000 PID/FID • Radiological contamination survey of accessible surfaces - NE Technology Model Electra or Ludlum Model 31 with 44-9 Probe and Ludlum Model 12-1A • pH of any liquids present
Debris	• Radiation Survey – Eberline Model RO-20 Beta/Gamma Radiation Detector • Combustible gases if voids are present - Mine Safety Appliances Model Passport • VOCs - Foxboro Model TVA 1000 P D/FID • Representative radiological contamination survey of accessible surfaces - NE Technology Model Electra or Ludlum Model 31 with 44-9 Probe and Ludlum Model 12-1A
Soil	• Low Energy Gamma Radiation Screening - Bicron FIDLER • VOCs - Foxboro Model TVA 1000 PID/FID

[1]Instruments are those anticipated to be used Equivalent instruments may be substituted after approval from Radiological Engineering or Industrial Hygiene
[2]Initial characterization will be performed in the order shown
[3]Action levels for individual instrumentation readings and the action to be taken can be found in Section 7 0 of the Trench 1 HASP (RMRS, 1998b)

If the container is not intact and field-screening results indicate the material is stable, the material will be inspected to determine if sampling is required, and, if necessary, sampled as described in Subsection 3 4 The material will then be carefully shoveled into an appropriate DOT 7A Type A waste package and covered to inert with soil After the waste package is closed, the enclosure will be surveyed for contamination If the enclosure and all material inside the enclosure are not contaminated, the enclosure may be de-posted and removed from over the waste package and work area The waste package will be transferred to the Trench 1 Waste Storage Temporary Unit, or moved to the location of the next container/material identified for removal The enclosure will be re-used as necessary or disposed of as radiologically clean waste, based on survey results

If at any time, field monitoring indicates the container or its contents are unstable or unsafe to handle (i e , extreme temperature increases) the material will be covered and inerted in-place with sand or soil Once the material is placed in a stable condition, work will pause for re-evaluation of proper controls and safeguards

Based on the limited amount of liquids observed in containers previously excavated from Trench 1, it is not likely that the subject container will be holding liquids However, if liquids are encountered the pH of the liquid will be measured and personnel will obtain a sample for characterization in accordance with the Starmet sampling and analysis plan (Starmet, 1998) If necessary, the liquids will be pumped or drained out of the container into a new appropriate waste package

3.3.2 Soil Removal

Soil surrounding the container will be hand-shoveled onto plastic sheeting and screened for levels of radiological and VOC contamination as shown on Table 3 1 The soil will be radiologically screened using a FIDLER per the RFETS Radiological Operating Instructions An organic vapor analyzer (OVA), or similar instrument, with a flame-ionization detector (FID) and photo-ionization detector (PID) will be used to screen for VOC contamination Table 3 2 summarizes the soil screening decision levels and soil segregation methodology to be used

Table 3.2
Soil Segregation Methodology

FIDLER Readings (cpm)[1]	VOC Readings Above Background Measurements (ppm)[2]	Depleted Uranium Content	Method of Soil Segregation
< 5,000	< 25	No depleted uranium	Stage for use as backfill
≥ 5,000	< 25	No depleted uranium	Package as mixed/low-level waste for direct disposal
NA	NA	Contains depleted uranium	Package for treatment[3]
NA	≥ 25	No depleted uranium	Package as mixed/low-level waste for treatment[3]

1 cpm - counts per minute
2 ppm - parts per million
3 - Treatment as designated in "Trench 1 Waste Characterization and Disposition Pathways Analysis Report" (RMRS, 1999b)
NA - Not Applicable

If there is evidence of contamination in the soil surrounding a breached container or other material encountered (e g , debris), the soil will be removed and containerized until only background levels are measured using the FIDLER and OVA Because a small volume of contaminated soil is expected from a single breached container, the soil may initially be placed directly into a plastic bag then containerized in an appropriately sized waste package Soil deemed clean will be returned to the excavation as backfill

If the container is breached and there is evidence of contamination outside of the container (e g , positive screening results or removable contamination on the outside of the container), sampling of the surrounding soil will be required (see Subsection 3 4) Soil contaminated with potentially pyrophoric depleted uranium will be placed in a separate waste package and inerted with soil All packaged soil will be stored in the Trench 1 Waste Storage Temporary Unit pending availability of future off-site treatment and/or disposal

3.3 3 Debris Removal

Miscellaneous debris, if encountered, will be visually inspected for stains or discoloration and surveyed and screened for radiological and VOC contamination as shown in Table 3 1 If the screening measurements indicate the presence of VOCs, the debris will be packaged as mixed/low-level waste If chemical contamination is not detected or suspected, the debris will be handled as low-level waste and packaged accordingly If necessary, debris will be sampled in accordance with the SAP (RMRS, 1998c)

3.3 4 Unknown Materials

Materials that cannot be immediately identified will be inspected for labels, markings, or other information and initially characterized as shown in Table 3 1 If the material is stable and safe to handle, it will be sampled inside the temporary enclosure per the Starmet sampling and analysis plan (Starmet, 1998) and appropriately packaged

If the unknown material presents an "Unanticipated Hazard or Condition," the material will be managed in accordance with RMRS policy statement Directive-001 Possible "Unanticipated Hazards or Conditions" and the corresponding response actions that should be followed are outlined in Section 7 7 of the HASP (RMRS, 1998b)

3 3.5 Suspected Classified Items

An item suspected of being "classified" will initially be characterized as shown in Table 3 1 to ensure the item can be safely handled The item will be isolated, and the RFETS Classification Office will be contacted to determine if the item is classified and to remove it if necessary

3 4 Container and Excavation Verification Sampling and Analysis

The contents of the discovered container and any other container identified through the geophysical survey investigation will require characterization This characterization will be performed with field information and data acquired from previous analytical results for the Trench 1 Source Removal Project or by using sampling and laboratory analysis of the container contents If the container is breached and there is evidence of contamination outside of the container, verification sampling of the surrounding soil will also be required The sampling and analysis activities will be conducted in accordance with the approved *Sampling and Analysis Plan (SAP) to Support the Source Removal at the Trench T-1 Site, IHSS 108*, RF/RMRS-98-205 (RMRS, 1998c) and the *Starmet Sampling and Analysis Plan for the Source Removal at Trench 1 IHSS 108*, RF/RMRS-98-220 (Starmet, 1998)

3 4.1 Container Characterization

The contents of any remaining containers removed from the Trench 1 excavation will require characterization to support final waste disposal If the contents are identifiable as the same type of material encountered in Trench 1, further sampling and analysis of this material will not be required Examples include

- Historic sample bottles with labels identifying the contents (e g , uranium hydride (UH_3) or tuballoy (TU)) that have previously been evaluated during the Trench 1 project,
- A depleted uranium ingot or "puck" type material that has previously been evaluated during the Trench 1 project

If the material cannot be identified, then further analysis is expected Examples include

- Radioactive turnings with elevated alpha to beta radioactivity ratios,
- Material not consistent with what was previously evaluated during the Trench 1 project

Two minor deviations from the SAP will occur

1 The samples will be collected directly from the containers inside the enclosure and not at the Sampling and Inerting Pad (SIP) used for the Trench 1 project, as the SIP no longer exists
2 If the container holds unidentifiable historic sample jars requiring analysis, samples will be collected Each sample jar will be placed into a plastic "zip-lock" bag The plastic bag will be placed into a waste package (e g , a metal 10-gallon drum) and the jar in the bag will be covered with a minimum

four-inch layer of inerting sand The sampler will breach the covered jar with a long-handled sledge or other appropriate implement The sampler will then carefully remove the plastic bag and transfer enough sample material to fill the sample jar If necessary, large glass fragments may be removed from the bag prior to transfer of the material into the new sample jar The glass will be packaged with the waste container Any remaining material in the bag not used for sampling will be inerted and packaged with the waste container The new sample jar will be transported to RFETS Trailer T900C for gamma spectroscopy analysis by Canberra Industries, Inc (Canberra) to evaluate for radioisotope concentrations

Potentially pyrophoric samples, if collected, will be managed as designated by ER *Operations Order No OO-T1-04, Onsite Transfer of Potentially Pyrophoric Samples from Trench 1 T-1 Source Removal Project* If liquids are present, pH will be measured and personnel will obtain a sample of the liquids for characterization in accordance with the Starmet sampling and analysis plan (Starmet, 1998)

3 4 2 Soil Characterization

If the container is breached and there is evidence of contamination outside of the container, verification samples will be collected from soil surrounding the container to verify all contamination has been removed Following removal of the container and related contaminated soil, one sample will be collected directly under the former location of the container and at least one sample will be collected on the side-wall of the excavation Emphasis will be placed on collecting the side-wall sample at a point closest to where the breach occurred The verification soil samples will be collected in the affected area in accordance with the SAP (RMRS, 1998c) If there is no indication of a breach and less than 5,000 cpm on the FIDLER is observed in soils, then no verification sampling of surrounding soil will be performed

3 4.3 Gamma Spectroscopy Analysis

Canberra Industries, Inc will perform gamma spectroscopy analyses Canberra is presently on standby subcontract to K-H Analytical Services division to perform gamma spectroscopy in RFETS Trailer T900C A Task Order will be prepared detailing the approximate number and type of samples that may require analysis Gamma spectroscopy analysis will be performed under the Statement of Work Determination of Radionuclides by Gamma Spectrometry, Module RC03-A 1, March 24, 1998, as amended

3 5 Waste Management

All waste streams generated during this project will be packaged for appropriate disposal per the ER *Operations Order No OO-T1-07, Packaging of Trench 1 Waste* The possible waste streams may include the following

- radioactive material inerted with soil or sand,
- contaminated soil,
- debris including metal, wood, plastic, trash,
- used PPE,
- liquid waste,
- decontamination waste water, and
- sanitary waste

Waste packages originating inside the enclosure will be decontaminated, if necessary, and surveyed for unrestricted release Once outside of the weather shelter, the packages will be transferred to the Trench 1 Waste Storage Temporary Unit

All sanitary waste will be managed in accordance with the *RFETS Sanitary Waste Off-Site Disposal Manual, 1-MAN-011-SODM* and the *Sanitary Waste Off-Site Procedures, 1-PRO-573-SWODP*

No incidental water is expected to be encountered since surface water run-on into the excavation does not occur with the weather shelter covering the work area Also, all excavation will be performed well above the normal groundwater levels at the site this time of year

3 6 Air Monitoring

3 6.1 Worker Protection

Radiological air sampling for particulate radionuclides will be performed inside the small temporary enclosure constructed over the container location Air sampling will be performed continuously inside the enclosure during the container removal activities One continuous air monitor (CAM) will be operated inside the enclosure vestibule (CA) The CAM will serve to alert potentially exposed individuals to unexpected increases in airborne radioactivity levels Response to CAM alarms will be in accordance with *RSP-4 01, Continuous Air Monitor - Use*

Real-time industrial hygiene air monitoring will be conducted inside the small enclosure to characterize potential personnel exposures and to ensure that airborne concentrations are below levels which are Immediately Dangerous to Life and Health (IDLH) Monitoring will be performed for VOCs, combustible gases, carbon monoxide, oxygen level, and particulates Since no diesel or gasoline powered equipment will be operated inside the enclosure, it will not be necessary to monitor for nitrogen dioxide and sulfur dioxide as previously performed for the Trench 1 excavation In addition to real-time monitoring, personnel integrated air sampling will be performed for dust, VOCs, metals, and cyanide

3 6 2 Air Quality

The Air Quality Management group will maintain project-specific environmental air monitoring during the container removal activities at the Trench 1 site The project-specific ambient air sampling at the site will consist of using one high-volume sampler located inside the weather shelter near the activities that have the greatest potential to release radionuclides into the ambient air, specifically, in close proximity to the temporary enclosure This enhanced monitoring will be based on scheduled project activities Samples from the monitor will be collected and analyzed for total alpha contamination Sample collection from the monitor will be conducted in accordance with ER *Operations Order No OO-T1-16, Ambient Air Monitoring Within the Temporary Structure During IDM and Backfilling Operations*

If a radionuclide release is suspected based on project information or the enhanced sampling results, then an event-sampling program will be implemented Event sampling may include, but is not limited to, expedited sample analyses and evaluation, additional sampling and analyses at various locations, and/or more frequent sampling at various locations The Trench 1 project air monitoring program is described in detail in the *Trench 1 Source Removal Air Monitoring Plan* (K-H, 1998)

The purpose of the enhanced, project-specific environmental air monitoring program is to provide ambient air and project emissions data necessary to determine, and manage, compliance with the public dose standard of Title 40 of the Code of Federal Regulations, Part 61 93, which has been determined to be protective of public health

3 7 Fire Control and Fire Suppression

In the event of a depleted uranium fire, appropriate fire control and fire suppression agents (i e , sodium chloride-based powder [MET-L-X] extinguisher and container of dry sand) will be located inside the small enclosure adjacent to the excavation work area Trench 1 personnel, designated by Project Management, have been trained by the RFETS Fire Departmen in using dry chemical and MET-L-X pyrophoric metals fire extinguishing techniques The RFETS Fire Department will be notified immediately of any fire or other potentially hazardous condition at the Trench 1 site

4.0 PROJECT ORGANIZATION

Project personnel responsibilities and authorities are presented in *ER Operations Order No OO-T1-02, Organization, Roles and Responsibilities* A project phone list is presented in Appendix D of this FIP Rocky Mountain Remediation Services, L L C (RMRS) will manage the project and coordinate support through the appropriate RFETS contractor or subcontractor The RMRS Radiological Safety Group will provide radiological safety and controls support per the *RFETS Radiological Control Manual* (K-H, 1996) Kaiser-Hill Company, Inc (K-H) Environmental Compliance will assist with the requirements for air monitoring and ecological support for the project

RMRS will act as the project waste generator and will coordinate and provide support for the project waste management and waste disposal operations K-H will conduct the required waste package inspections and maintain records to meet waste package certification requirements

5 0 HEALTH AND SAFETY

The RMRS *Site-Specific Health and Safety Plan (HASP) for the Source Removal at Trench 1* (RMRS, 1998b) will be the lead document for worker health and safety during the container removal activities This HASP will apply to all RFETS contractors, subcontractors, and visitors involved in operations, management, or administration at the Trench 1 site The HASP addresses the hazards associated with the Trench 1 Source Removal Project and establishes guidelines to protect project personnel, collocated workers, the general public, equipment, and the environment during field activities To address new work scope to remove the discovered container, a task-specific Activity Hazardous Analysis (AHA) was developed and approved for the container removal activities and incorporated into the HASP This AHA

addresses potential hazards associated with manually excavating the discovered container and other possible materials from the excavation side-wall A copy of the task-specific AHA is presented in Appendix E

Work inside the temporary enclosure will be performed in Level B protective equipment, or as designated in the HASP RMRS will conduct training specific to the supplied air equipment used at the site before initiation of field activities Project-specific training required for the container removal activities is consistent with the training required for the implementation of the Trench 1 Source Removal Project as described in Section 6 0 of the HASP Project personnel performing the removal activities have received (and are current in) the training designated in the HASP Personnel entering areas controlled for radiological purposes will comply with the requirements of the task-specific Radiological Work Permit for those areas

6.0 SPILL RESPONSE AND CONTAINMENT

No incidental spills of contaminated soil or hazardous materials are anticipated outside of the small temporary enclosure since all contaminated and hazardous materials generated during the removal activities will be packaged in RFETS-certified waste packages or sample containers before being transferred outside of the enclosure The container removal activities may cause (small) incidental spills of contaminated soil, or other hazardous materials inside the enclosure Incidental spills are defined as spills where the substance can be safely absorbed, neutralized, or otherwise controlled by employees in the immediate release area at the time of the release In addition, the release does not have the potential to become an emergency within a short time

The following spill response procedures will be performed to contain, control, and cleanup potential incidental spills *Emergency Response and Spill Control Procedure (1-NO8-HSP-21 04) and Occurrence Reporting Procedure (ADM 16 01)*, and RFETS incidental release response actions and occurrence reporting requirements (DOE Order 5000 3)

Prompt notification of the Project Manager and Shift Superintendent will be made reporting the type, volume, time, and spill response actions to be performed to contain the incidental release If the spill involves potentially radioactive contaminated soil or materials, Radiological Safety, Radiological

Engineering, and Air Quality Management will also be notified Project personnel will be adequately trained and have proper PPE and equipment to respond to most potential spills within the enclosure If the release is not incidental and cleanup cannot be performed in a safe manner, the release requires implementation of the emergency spill response procedures per the site-specific HASP (RMRS, 1998b)

7 0 REFERENCES

Department of Energy (DOE), Order 5000 3

Department of Energy (DOE), Order 5480 19

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Kaiser-Hill Company, Inc , 1998, Trench 1 Source Removal Air Monitoring Plan, Rocky Flats Environmental Technology Site, Golden, Colorado, January

RMRS, 1998a, Final Proposed Action Memorandum for the Source Removal at Trench 1, IHSS 108, Rocky Flats Environmental Technology Site, Golden, Colorado, RF/RMRS-97-011, Rev 4, July

RMRS, 1998b, Site-Specific Health and Safety Plan for the Source Removal at Trench 1 Site, IHSS 108, Rocky Flats Environmental Technology Site, Golden, Colorado, RF/RMRS-97-010, April

RMRS, 1998c, Sampling Analysis Plan to Support the Source Removal at the Trench T-1 Site, IHSS 108, Rocky Flats Environmental Technology Site, Golden, Colorado, RF/RMRS-98-205, March

RMRS, 1999a, Safety Analysis for Individual Hazardous Substance Site (IHSS) 108, Trench 1 (T-1) Source Removal Project, Rocky Flats Environmental Technology Site, Golden, Colorado, January

RMRS, 1999b, Trench 1 Waste Characterization and Disposition Pathways Analysis Report, Rocky Flats Environmental Technology Site, Golden, Colorado, RF/RMRS 99-303 UN, January

Starmet, 1998, Starmet Sampling and Analysis Plan for the Source Removal at Trench 1 IHSS 108, Rocky Flats Environmental Technology Site, Golden, Colorado, RF/RMRS-98-220, April

APPENDIX A

Implementation of Conduct of Operations
For Removal of the Discovered Container At
Trench 1 (IHSS 108)

CONDUCT OF OPERATIONS (COOP)
Implementation of COOP for Removal
of the Discovered Container at Trench 1 (IHSS 108)
January 1999

CONDUCT OF ON-SHIFT TRAINING
Purpose Establishes the necessary on-shift evaluation and qualification training requirements for all on-shift instructors, and operations and support personnel

Project personnel will comply with all onsite training requirements and three-day On-the-Job-Training (OJT) for hazardous waste operations Subcontractors will also comply with project-specific training performed onsite and the three-day OJT for hazardous waste operations Day shift operations only

LOGS AND ROUND SHEETS
Purpose Defines the process for identifying and controlling operating logs and other records to ensure maintenance of complete and accurate operational histories Environmental Restoration Management systems which do not affect, connect to, or interface with RFETS systems or utilities and which are owned and being operated by subcontractors, are exempt from this procedure

Provides instructions for performing operator rounds to monitor and record system and process parameters for each operating shift Requires operations personnel to tour operations once per shift Used to identify and correct undesirable trends and equipment problems and to facilitate turnover of equipment status This procedure will be used as applicable

Subcontractors and RMRS will maintain controlled logbooks per 2-S47-ER-ADM-05 14, Use of Field Logbooks and Forms, to document field activities during the implementation of the Trench 1 project

LOCKOUT/TAGOUT (LO/TO), CAUTION TAGS, AND INFORMATION TAG REQUIREMENTS
Purpose Describes the process for controlling Caution Tags to continue operating equipment and facilities when situations arise that require special temporary cautionary measures

This procedure applies to Trench 1 operations and the Field Supervisor will defer to the Lockout/Tagout manager for either a Caution Tag or Lockout/Tagout of the affected equipment Lockout/Tagout of affected equipment will be performed in accordance with HSP 2 08

CONTROL AND USE OF OPERATOR AIDS
Purpose Defines the process for controlling operator aid postings and information tags for the safe operation of RFETS

This procedure is applicable and Trench 1 project management personnel will control and post operator aids as applicable Operator aids will be controlled and maintained by the Field Supervisor

PRE-EVOLUTION BRIEFINGS (PEBs)
Purpose Describes the process for preparing, scheduling, and conducting Pre-Evolution Briefings (PEBs) to identify and address Conduct of Evolution to mitigate potential impacts to the public health, safety, or the environment resulting from a scheduled evolution

This procedure is applicable to all phases of the Trench 1 project A PEB is given to all team members prior to each task The Trench 1 project will have a PEB prior to the site preparation, excavation, inerting, and site reclamation tasks and when there are changes in scope of a task or for new personnel

STANDING, OPERATIONS, AND SHIFT ORDERS

Purpose Provides procedures for development, approval, distribution, revision, cancellation, and maintenance of Standing, Shift, and Operations Orders

Trench 1 site personnel will comply with any Standing, Shift, and/or Operations Orders which apply to project operations The Field Supervisor will control and maintain Trench 1 Operations Orders as applicable

COMPONENT LINEUPS AND INDEPENDENT VERIFICATION

Purpose Describes administrative controls to perform Independent Verification (IV) for components and system alignment Required for valves, breakers, and other components in any system that provides life support (e g , breathing air) to personnel Required for valves, breakers, and other components in any system that could result in a release of hazardous materials or energy where personnel and environmental safety is concerned

This procedure is not applicable to the breathing air system used for the Trench 1 project The Trench 1 breathing air system is a portable cascade Grade D certified breathing air system where an air trailer and air trailer operator are at the immediate area of breathing air use The air trailer operator maintains surveillance of personnel using supplied air at all times Ground personnel will utilize MSA ultralite quickfill, SCBA air equipment which is refilled by the individual ground personnel during use The air trailer operator maintains eye contact with the ground personnel during refilling of the SCBA Each piece of air equipment is equipped with alarm bells, which sound when air supply is low, and emergency egress air supply bottles Air gauges and air equipment are examined and performance checked at the beginning of each work shift Air tanks are refilled as necessary

Project personnel are trained in the use of the air equipment prior to initiating work As part of the project-specific breathing air training, personnel are instructed on how to perform emergency egress if their air equipment fails

COMMUNICATIONS

Purpose Defines the communication criteria required to ensure a complete and consistent exchange of information or instruction

Applicable to all phases of the Trench 1 project Ensures communications contain information or directions necessary to successfully achieve the desired result Give directions that are explicit, understandable, and include who is giving the direction, who is to perform the action, what is to be done and why, when it is to be done, what procedure, if applicable, and additional communication required (when to report the task is completed) Minimize multiple actions in verbal instructions, write down multiple actions or give several short verbal instructions after each task is completed When verbally receiving data, write down the information and do not rely on memory The recipient acknowledges all

communications by repeating back the communication as necessary to ensure the originator's communication is understood Reporting emergencies per procedures (e g , HASP, FIP), and conduct communications so as to not interfere with timely mitigation of the emergency Procedure details written, verbal, and hand signal and gestures to be used, and addresses telephone and two-way radio communication procedures

PLAN OF THE DAY (POD)

Purpose Provides requirements, guidelines, and instruction with the Plan of the Day (POD) process used to control operations and maintenance activities at RFETS

This procedure is applicable to all phases of the Trench 1 project Project personnel schedule field work on the Environmental Restoration Plan of the Week, each week During field work, a POD/tool box meeting is conducted each day by the field supervisor, covering lessons learned from the work completed the previous day and the scope of the work to be performed that day, and the industrial hygienist, covering the potential hazards and hazard mitigation which are summarized on the task-specific Activity Hazard Analyses Team members are requested to provide input into the POD and are reminded that safety is first Project staff will encourage subcontractors to be proactive in their own safety programs and challenge them to respond accordingly

CONTROLLED DEACTIVATION OF ALARMS

Purpose Describes actions to be taken for deactivation and reactivation of all alarms affecting safety at RFETS and to ensure compliance with applicable Operational Safety Requirements (OSRs) and Limiting Conditions for Operations (LCOs)

Trench 1 will not be utilizing an alarm system which is applicable to OSRs or LCOs

APPENDIX B

Trench 1 Quality Assurance Implementation Plan

TRENCH 1 QUALITY ASSURANCE PROJECT PLAN (QAPjP)

QUALITY ASSURANCE CRITERIA per 10CFR830 120

1 0 MANAGEMENT
- 1 1 Program
- 1 2 Personnel Training and Qualification
- 1 3 Quality Improvement
- 1 4 Documents and Records

2 0 PERFORMANCE
- 2 1 Work Processes
- 2 2 Design
- 2 3 Procurement
- 2 4 Inspection and Acceptance Testing

3 0 ASSESSMENTS
- 3 1 Management Assessment
- 3 2 Independent Assessment

4 0 REFERENCES

ATTACHMENTS
- Attachment 1 Document Hierarchy for the T-1 Project
- Attachment 2 QA Implementation Matrix for the T-1 Project
- Attachment 3 Detail of Quality Records
- Attachment 4 Trench T-1 Surveillance Schedule

TRENCH 1 QUALITY ASSURANCE PROJECT PLAN (QAPjP)

QUALITY ASSURANCE CRITERIA per 10CFR830 120

QA criteria listed in this project plan are the required elements to comply with DOE's quality requirements as defined in 10CFR830 120 The application and implementation of these criteria into items and services shall be consistent with the graded approach The graded approach is a "process of basing the level of application of managerial controls applied to an item or work according to the intended use of the results and the degree of confidence needed in the quality of the results" (E-4, ANSI/ASQC, 1994) The graded approach is also a function of safety (risk) and security required to accomplish program objectives (10 CFR 830 3)

In practical terms, the graded approach requires selective application of QA requirements and control to items and services commensurate with their importance to safety and project objectives The USEPA states that "Environmental data operations encompass diverse and complex activities, and they represent efforts pertaining to rulemaking, compliance with regulations, and research Consequently, any plan that is developed to represent how QA/QC should be applied to environmental activities must contain considerable flexibility " (EPA, 1994a) The content and level of detail in this QA Project Plan is tailored to the nature of the work and associated risk with the T-1 Project Hazardous and radiological risks, including catastrophic bounding conditions, have been thoroughly characterized for this project in the **Site-Specific Health & Safety Plan (HSP, RF/RMRS-97-010)**, the **ALARA Job Review (RF/RMRS-98-208)**, and the **Nuclear Safety Technical Report (RF/RMRS-98-215)**

References cited in this document are included in Section 4 0, References, whereas RFETS-internal documents are referenced throughout this QA Project Plan by control numbers maintained at RFETS by either RMRS or Kaiser-Hill

MANAGEMENT

Program

The T-1 quality program implements requirements set forth in 10CFR830 120, which are "flowed down" through the RFETS-specific quality documents of Kaiser-Hill **(K-H Team Quality Assurance Program, 12/15/97)** and RMRS **(RMRS-QAPD-001, Quality Assurance Program Description)** Key personnel and organizations for project management are given in Figure 3-1 of the FIP **(Field Implementation Plan for the Source Removal at Trench 1, IHSS 108)** The organization chart illustrates the infrastructure, functional responsibilities, levels of authority, and organizational interfaces necessary to accomplish the project's goals and RMRS's contractual commitments Organizational roles and responsibilities are further delineated in the **Operations Order OO-T1-02, "Organizational Responsibilities"**

The T-1 document hierarchy (Attachment 1) and QA Implementation Matrix (Attachment 2) provide a general perspective of the documents establishing the management structure in place for the T-1 project Specific document and record control numbers may be obtained through review of the T-1 Project Files and/or the RMRS Records Center

Personnel Training and Qualification

Personnel shall be qualified to perform their respective tasks based on a combination of education, training, and experience Education and professional experience shall constitute the primary means of qualification for activities that emphasize problem-solving strategies, where creativity and innovation are essential components of optimizing the activity or item Conversely, training shall be the primary means of qualification where

- consistency and team coordination constitutes a major component of the overall quality (or safety) of the process or item, **and**
- the process is well established, proven, and perfunctory

Training requirements specific to T-1 are given in Table 6 1 of the **HSP and in the T-1-specific list of qualified individuals (LOQI)** In addition, a project-specific QA briefing will be given during the pre-evolution briefing prior to project start-up in the field, and to new personnel prior to their participation on the project The QA briefing will cover the requirements stated in this QA Project Plan and will be documented via the pre-evolution attendance roster QA personnel are qualified and certified per **RMRS-QA-02 01, "RMRS Qualification and Certification of Quality Assurance Personnel"**

Fundamental education and experience are captured by transcripts and resumes, which are maintained by RMRS Human Resources or the subcontractor, as applicable Site-specific and project-specific training records are managed within the T-1 Project File and the **K-H TSR (Training, Scheduling, and Records) database** Qualification requirements and records may also be maintained through the project manager, individual staff, procurement (within contractual agreements), and/or a centralized training group within RMRS or the IMC (K-H) The T-1 QA Implementation Plan (Attachment 2) tabulates the documents and records that establish (i e , plan and implement) T&Q within T-1 project

Quality Improvement

Quality improvement shall be realized through use of a systematic means of identifying, tracking, and correcting problems (deficiencies, nonconformances, issues, etc) Problems may be identified by any project personnel, at any time, through formal documentation of issues as stated in **RMRS-QA-03 01, "Corrective Action"** Management and independent assessments will also be used to identify, track, and correct issues (Sections 3 1 and 3 2) The extent of causal analysis and corrective action shall be commensurate with the significance of the failure or problem "Lessons Learned" shall be communicated to staff from management where appropriate

Documents and Records

Work-controlling documents, such as work plans (including Integrated Work Control Packages -- IWCPs), standard operating procedures, Health and Safety Plans, etc , shall be controlled, where "control" is constituted by the following criteria

- the documents are uniquely identified for refererice purposes,
- the required reviews and approvals are accomplished, and,
- the personnel, who need the documents to perform work, receive the latest approved versions of the document(s)

The document control process is described in RMRS procedure **DC-06 01, "Document Control Program"** Essential policies, plans, procedures, decisions, data, and transactions of the project will be documented to an appropriate level of detail The objective shall be to maximize the utility of records and data for accomplishment of performance objectives while minimizing the cost of information management and paperwork for the project (RMRS) and its subcontractors The documents contro ling this project are summarized in Attachment 1 and are tabulated in Attachment 2

All documents that constitute contractual deliverables (from RMRS to the client), such as work plans or final reports, shall undergo a minimum of three reviews, internally within RMRS, to ensure that minimum quality requirements are met

- a management review (level of management higher than originating author(s)),
- a technical/peer review (as determined by management), and,
- a quality assurance review

The project manager will assign other technical reviewers, as applicable, to cover the technical disciplines represented within the document

Quality records, including digital data stored on computerized media, shall be managed to ensure that information is retained, retrievable, and legible Active records will be maintained by project personnel, including RMRS subcontractors, in an organized and retrievable fashion, until such time that the records have served their purpose and become inactive Quality records are considered active until the final peer reviews are conducted, thus, quality records are not subject to the 30-day limit on turnover to the Records Center until final peer reviews are conducted Peer reviews of records must be conducted on records completed by the originator within two (2) weeks of completion Records at the job-site shall be stored and protected in fire-safe boxes

Quality records managed by subcontractors will be acquired by RMRS through the standard processes of procurement and subcontracting Only inactive records will be sent and maintained in records storage facilities Records turnover and archival are controlled through **RM-06 02, "Records Identification, Generation, and Transmittal"**

Quality records resulting from direct measurements or technical sampling activities shall be authenticated by the originator and subsequently authenticated by a peer reviewer ("QC checked") For data uploaded to computer from the quality records described above, final data entry (as portrayed on hardcopy output) must be reviewed by someone other than the data entry person, and the hardcopy must be authenticated by the reviewer, errors on quality records shall be corrected by striking through the original entry with a line, and incorporation of the correct data adjacent to the strike-out Authentication is also required for corrections

The documents that control this project, as well as the (quality) records that will corroborate implementation of the controlling documents, are summarized graphically in Attachment 1, and are listed in Attachments 2 and 3 Documents and records to be placed in the CERCLA Administrative Record shall be dispositioned via **RM-06 04, Administrative Record Document Identification and Transmittal**

Kaiser-Hill Analytical Services is responsible for all original records produced concerning lab-generated chemistry and radiochemistry data, the T-1 project will use data as provided by K-H Analytical Services or their subcontractors

PERFORMANCE

Work Processes

Workforce

Management shall hire and maintain a workforce capable of performing the project objectives as set forth in the PAM and the FIP Establishment and maintenance of the workforce for this project shall be within budgetary constraints as defined by the IMC (K-H)

Individual workers are responsible for the quality of their work Management shall provide the workforce with the tools, materials, and resources (including training) necessary for successful accomplishment of their assigned tasks Performance criteria for personnel shall be established and clearly communicated to the individuals

Material Resources

Materials and equipment that affect quality (of items or services) or health and safety shall be controlled, i e , identified, maintained, and traceable according to its intended purpose Measurement, monitoring, and data collection equipment shall be of the accuracy and resolution needed for their intended purposes based on calibrations Calibrations shall be traceable to nationally recognized or industry standards Essential policies, plans, procedures, decisions, data, and transactions of the project will be documented to an appropriate level of detail

Design

General

Sound engineering/scientific principles and appropriate technical standards shall be incorporated into designs to ensure that they perform as intended, including use of the RFETS Conduct of Engineering Manual

Final designs, as documents, quality records, or computerized data, shall undergo validation through peer review Peer reviews shall be commensurate with the scale, cost, specialty, and hazards of the item or activity in question Management approval, in addition to peer and quality reviews of designs, shall be effected prior to procurement, manufacture, construction, or field implementation Peer and quality reviews are corroborated through

documented comment resolution of the design reviews

Data Acquisition and Sampling

The Data Quality Objective (DQO) process (EPA, 1994, QA/G-4) has been adopted for all data collection activities for this project Both the EPA and the DOE Office of Environmental Management have established the DQO process as policy (EPA QA/R-5 and DOE, 1994, respectively) for determining the types, quality, and quantity of data needed for environmental and waste management decision-mak ng, while optimizing time and cost considerations

Although the process is not explicitly laid-out in the seven steps for each data collecting activity, all data acquisition and sampling activities are associated with action levels for quantitative comparisons and subsequent decisions that allow error, or uncertainty, to be quantified In particular, sampling and analysis for determining environmental and waste management decisions are captured in the RMRS and Starmet Sampling and Analysis Plans (SAPs, RF/RMRS-98-205 and RF/RMRS-98-220, respectively) Radiological monitoring for real-time health and safety data acquisition and consequent decision-making, is covered in the **Radiological Work Permit (RWP)** and the **ALARA Job Review (RF/RMRS-98-208)** The **Air Monitoring Plan (DOE memorandum 98-DOE-03303)**, and **Operations Order OO-T1-08, "Ambient Air Monitoring within the Temporary Structure" also acquire environmental air data** Industrial Hygiene monitoring is addressed in the RMRS HSP

Computerized Systems (Software/Hardware)

Design-control of computerized systems shall be commensurate with the hazards associated with the process for which the computer system controls Systems controlling critical health and safety processes shall be verified and validated as prescribed in either the T-1 HSP or the ROIs, and must simulate working conditions prior to usage in real settings Such systems shall also be tested periodically to ensure functionality as defined in the **RFETS Radiation Control Manual** or the **T-1 HSP**

Computerized systems used for data reduction and analysis shall be controlled to

- ensure traceability of changes made to original data, and
- allow independent peer reviewers to relate inputs to outputs

RMRS digital data shall be controlled after the **ERPD Software Management Plan (10/21/94), 2-G24-ER-ADM-19 01**, but is planned for revision during the summer of 1998 Computerized systems used for measurements shall be calibrated via "system calibrations", i e , while integrated with the relevant transducers

Procurement

Quality requirements shall be delineated in procuremen and subcontract documents All contracts (subcontracts) let by RMRS shall be reviewed for QA requirements to ensure that adequate quality controls are established and implemented by the subcontractor

Suppliers or vendors shall be established and used according to the Procurement Levels defined in the Level 1 site procedure **1-W36-APR-111, 'Acquisition Procedure for Requisitioning Commodities and Services"**

Inspection and Acceptance Testing

Items or activities that require inspections and/or acceptance testing will be specified in work-controlling documentation (e g , work plans, standard operating procedures, data management plans, etc) Acceptance criteria and any hold points shall be clearly defined, and will be based on manufacturer's specification unless otherwise stated Measurement and test equipment (M&TE) will be accepted or rejected based on calibration information and pre-established tolerances, including unique identification, traceability, accuracy, resolution, measurement ranges, and acceptance/rejection criteria Calibration standards shall be traceable to nationally recognized or industry standards

ASSESSMENTS

Management Assessment

At least once during the fielding of the project, management shall evaluate the organization to determine the effectiveness of the Quality Assurance Plan and overall RMRS organization performance Management assessments shall be documented through annual reports, periodic status reports, internal memoranda, or other suitable reporting means, and are performed according to **RMRS-QA-09 01, "Managernent Assessments"**

Independent Assessment

Independent assessments, in contrast to management assessments, shall be performed by personnel who are not directly responsible for the work being performed Independent assessments are performed according to **RMRS-QA-10 02, RMRS Conduct of Surveillances** and **RMRS-QA-10 01, Independent Assessments**

Independent assessments shall

- be based on the RMRS QA Plan, and other controlling documents as necessary,
- evaluate the performance of work beyond the mere review of documents and records (i e , relative to technical specifications and project-specific data quality objectives and associated management decisions),
- act as management advisory functions, and,
- view the organization being assessed as the "customer" of the assessment results, and strive to produce useful feedback on RMRS assets and liabilities with respect to the RMRS mission and performance objectives

A schedule of RMRS assessments planned for the project is given in Attachment 4

REFERENCES

10CFR830 120, Quality Assurance

10 CFR 830 3

ANSI/ASQC E4-1994 *American National Standard, Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs*

DOE, 1994 T P Grumbly Memorandum to Distribution, *Institutionalizing the Data Quality Objectives Process for EM's Environmental Data Collection Activities*, September 7, 1994

DOE, August, 1991 DOE Order 5700 6C

EPA, 1997 EPA Requirements for Quality Assurance Project Plans, QA/R-5

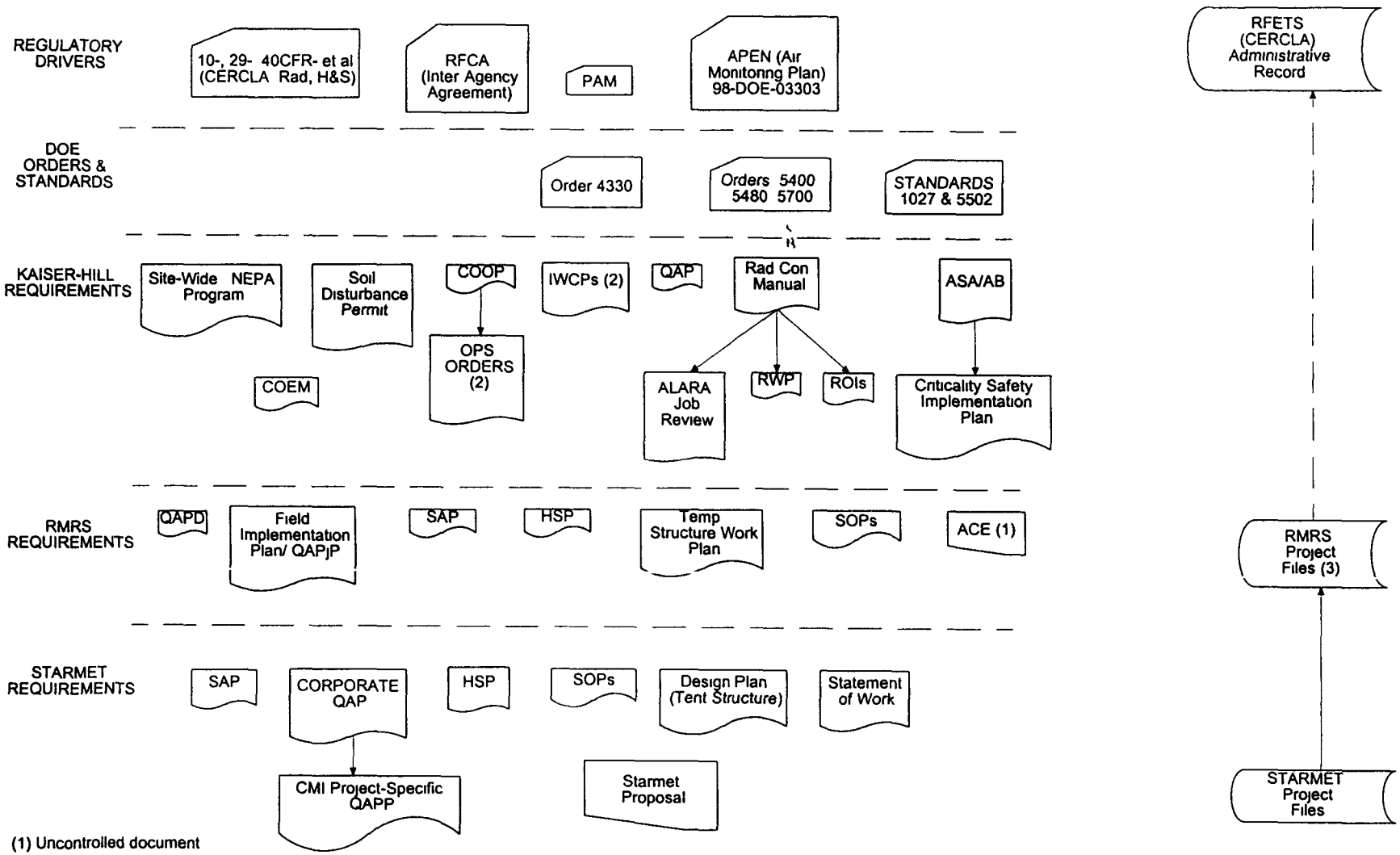
EPA, 1994 Guidance for the data quality objectives process, EPA QA/G-4

EPA, 1998 Guidance for the data quality assessment process, EPA QA/G-9

DOCU[illegible]K

RECORDS

DOCUMENT HIERARCHY & QUALITY RECORDS for the T-1 TRENCH PROJECT, FY98



(1) Uncontrolled document

(2) see Attachment 2 for specific breakdown

(3) see Attachment 3 for specific breakdown

ATTACHMENT 1

QA/QC IMPLEMENTATION MATRIX for the T-1 PROJECT

QUALITY REQUIREMENT		PROOF of IMPLEMENTATION	CONTACT	PHONE
MANAGEMENT				
PROGRAM		Proposed Action Memorandum (PAM)	W Sproles	x5790
		Rocky Flats Cleanup Agreement (RFCA)	L Brooks	x6130
		RMRS QA Program Description	G DiGregorio	x5688
		Starmet QAPP CMI-RM708626PZ3	G DiGregorio	x5688
		RMRS T-1 QAPjP (Appendix B of the FIP)	S Luker	x7291
TRAINING/QUALS		Health & Safety Plan (HSP – lists requirements)	K Gillespie	x5356
		RMRS Human Resources (Personnel Files)	S Sutton	x2134
		Readiness Review (verifies personnel training)	M Bemski	x4090
		Starmet Training & Qualification Records	M Burmeister	x5891
		SOWs/Contracts (for subcontractors)	T Vetack	x8170
		List of Qualified Individuals (LOQI)	R Wagner	x3102
		TSR (Training Scheduling & Records)[1]	B DiSalle	x3735
QUALITY IMPROVEMENT		Plant Action Tracking System (PATS)	V Valencia-Beckman	x6490
		Corrective Action SOP (RMRS-QA-03 01)	M Prochazka	x4747
		RMRS QA Surveillance Reports	G DiGregorio	x5688
CONTROLLING DOCUMENTS		Summarized Document Hierarchy, ACE & FIP	G DiGregorio	x5688
		Document Control Index	K Manzanares	x5430
		Subcontractor Statements of Work (SOWs)	M Burmeister	x5891
		Control of RMRS Documents (DC-06 01)	K Manzanares	x5430
RECORDS		Sampling & Analysis Plan Records	H Salomon	x6627
		RMRS QA Surveillance Reports	G DiGregorio	x5688
		Project History File (compendium)	A White	x5180
		K-H Analytical Services (analytical/rad chem results)	V Ideker	x3437
		T-1 Final Report(s)	W Sproles	x5790
		H&S Quality Records (see Attachment 3)	K Gillespie	x5356
		Radiological Quality Records (see Attachment 3)	J Miller	x2454
		Administrative Record (AR)	L Tyler	x4580
		Daily Shift Reports	R Wagner	x3102
		Field Logbooks (controlled)	G DiGregorio	x5688
		ER GIS Database (ARC/INFO, land surveys/GPS)	W Cheeks	x7707

QA/QC IMPLEMENTATION MATRIX for the T-1 PROJECT

QUALITY REQUIREMENT	PROOF of IMPLEMENTATION	CONTACT	PHONE
PERFORMANCE			
WORK PROCESSES	RMRS QA Surveillance Reports	G DiGregorio	x5688
	Field Implementation Plan	T Spence	x4322
	IWCPs (Integrated Work Control Packages)	A Helmick	x7604
	Install/Demobe 3 Field Trailers (T0093998)		
	Prepare T-1 Area for Trailer Installations (T0094267)		
	Minor Maintenance Craft Support for T-1 (T0094294)		
	Install Electricity/Communications to Trailers (T0094304)		
	Trench-1 Site Preparation - Rev 1 & Rev 2 (T0094955)		
	Install Site Power Distribution to T-1 Tent (T0095000)		
	Construct Temporary Structure at T-1 (T0095355)		
	Excavate Trench-1 (IHSS 108) (T0095380)		
	Operations Orders	S Martin-Lewis	x6643
	Shift & Operations Orders Admin Procedure (OO-T1-01)		
	Organization Roles & Responsibilities (OO-T1-02)		
	Visitor Orientation (OO-Tt1-03)		
	Storage & Transfer of Potentially Pyrophoric Samples (OO-T1-04)		
	Use of MSA SCBA and Premaire Line Systems (OO-T1-05)		
	Refueling of Heavy Equipment w/in the Tent (OO-T1-06)		
	Waste Packaging (OO-T1-07		
	Ambient Air Monitoring w/in the Tent (OO-T1-08)		
	Temperature Measurements of DU w/ a Heat Gun (OO-T1-09)		
	Inspection of Emergency Response & Safety Equipment (OO-T1-10)		
	Trench-1 Shift Turnover and Tours (OO-T1-11)		
	Kaiser-Hill Radiological Control Manual (Rad Con Manual)	J Barroso	x8451
	Radiological Operating Instructions (ROI)	J Barroso	x8451
	Conduct of Engineering (COE) Manual	R Wagner	x3102
	Conduct of Operations Manual	R Wagner	x3102
	Starmet Work Plan	M Burmeister	x5891
	Subcontractor Statements of Work (incl Gamma Spec)	V Ideker	x3437
	Starmet		
	Kaiser-Hill Analytical Services (incl Gamma-Spec)		
	Air Monitoring Plan (w/in the APEN)	J Jeanperrin	x5483
	Radiological Work Permit (RWP)	J Barroso	x8451
	SOPs -- RMRS for RFETS and Starmet for Barnwell Facility	G DiGregorio	x5688

QA/QC IMPLEMENTATION MATRIX for the T-1 PROJECT

QUALITY REQUIREMENT		PROOF of IMPLEMENTATION	CONTACT	PHONE
DESIGN		Authorization Basis (AB)/Audit Safety Analysis (ASA) {Nuc Safety Tech Report}	J Kirar	x7844
		Activity Control Envelope (ACE)	W Sproles	x5790
		IWCPs (listed above)		
		Sampling & Analysis Plans (RMRS & subcontractors)	H Salomon	x6627
PROCUREMENT		SOWs (which include QA requirements)	W Sproles	x5790
		T-1 QAPjP (Appendix B of the FIP)	S Luker	x7291
		Approved Supplier List for selected purchases		
		Pre-Receipt Inspection Reports of subcon	G DiGregorio	x5688
INSPECTION/ACCEPTANCE TESTING		calibration/maintenance records for M&TE	G DiGregorio	x5688
		shipping manifests		
		waste travelers		
ASSESSMENTS				
MGMT		RMRS Mgmt Assessment Reports (memos)	M Burmeister	x5891
INDEPENDENT		RMRS QA Surveillance Reports	G DiGregorio	x5688
		RMRS QA Surveillance Schedule	G DiGregorio	x5688
		Independent Assessments (RMRS-QA-10 01)	J Hernandez	x2571
		K-H Assessment Reports	D Gillespie	x2413
		[1]Sitewide database		

DETAIL OF QUALITY RECORDS[1]

HEALTH & SAFETY QUALITY RECORDS
- Daily Instrument Calibrations
- Daily H&S Logs (per person)
- Safety Compliance Agreement
- Daily IH Monitoring Logs (real time)
- Operators Daily Heavy Equipment Checklist
- Daily H&S Briefing Roster (tailgate meetings)
- Heat Stress/Cold Stress Monitoring Logs
- IH Air Sampling Form (lab samples)
- Overall Inspection Reports
- Employee Notification of Personal Air Sampling Results
- OSHA 200 Logs (may be plantwide, not project-specific)
- COCs for H&S Samples
- Checklist for use of SAR/SCBA Respirators

RADIOLOGICAL QUALITY RECORDS
- Radiological Dose Survey Forms (incl survey map)
- Radiological Contamination Survey Forms (incl survey map, DPM/100cm^2)
- Radiological Operations Alpha &/or Beta Surveys (incl maps, CPM & DPM/100cm^2)
- Radiological Operations Gamma Surveys (incl survey map, CPM & DPM/100cm^2)
- Air Sampling Results (incl high vol , low vol, and CAMs)

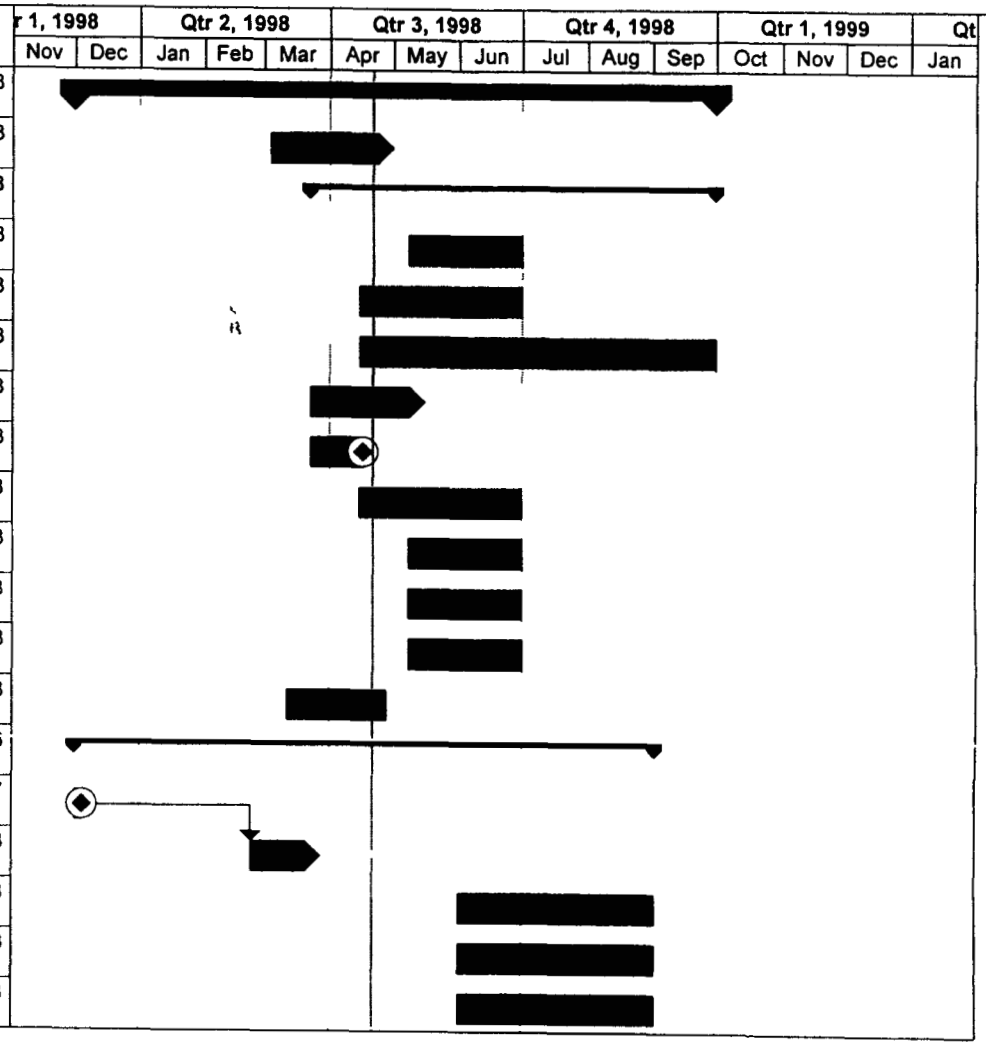
ADMINISTRATIVE RECORDS
- Field QA Records Transmittal Form

OTHER TECHNICAL QA RECORDS (related to implementation of SOPs)
- Equipment Decontamination/Wash Checklist
- Heavy Equipment Decontamination/Wash Checklist
- Verification of Organic Vapor Monitoring Results (FO 8)
- Chain of Custody (COC)
- Electronic Data Deliverables (EDDs, containing analytical & radiochemistry results in a database format)
- Waste Logs

[1]Generic titles of the records are listed, data may be archived digitally, which will be tracked by file name, dates & titles are managed through RMRS Document Control

TRENCH T-1 SURVEILLANCE SCHEDULE

ID	Task Name	Start	Finish
1	Trench T 1 Surveillance Schedule	12/1/97	9/30/98
2	Readiness Assessment	3/4/98	4/23/98
3	Records	3/23/98	9/30/98
4	sampling records	5/8/98	6/30/98
5	radiological records	4/15/98	6/30/98
6	miscellaneous records	4/15/98	9/30/98
7	training and qualifications	3/23/98	5/8/98
8	Tent Shelter	3/23/98	4/16/98
9	COOP Elements	4/15/98	6/30/98
10	Procedure Implementation and Work Processes	5/8/98	6/30/98
11	RMRS SAP	5/8/98	6/30/98
12	STARMET SAP	5/8/98	6/30/98
13	Measuring Testing and Equipment	3/12/98	4/27/98
14	STARMET Facility	12/1/97	9/1/98
15	quality assurance program 1	12/1/97	12/4/97
16	quality assurance program 2	2/23/98	3/20/98
17	sampling	6/1/98	9/1/98
18	treatment	6/1/98	9/1/98
19	waste packaging	6/1/98	9/1/98



Project Trench T 1
Date 4/21/98

Task
Summary
Milestone
Completed Task

C \WINPROJ\T 1SURV2 MPP

APPENDIX B

4/21/98

APPENDIX C

Outline for Removing the Discovered
Two- to Five-Gallon Container
From the
Trench 1 North Excavation Side-Wall

Outline for Manually Removing the 2- to 5-gallon Container from the Trench 1 Excavation North Side-Wall

1 Expose Upper Surface of Container

Expose upper surface of the container by removing the soil piled on the south side of the container using hand shovels Remove only enough soil to expose the container lid and vertical surface immediately below the rim of the lid - to expose only the surface of the container that was originally exposed This will ensure that the original soil deposits around the container are left undisturbed

2 Measure Initial Temperature of Container Surface

Measure the initial "baseline" temperature of the container using a hand-held infrared thermometer Record the "baseline" temperature All temperature measurements will be conducted in accordance with ER Operations Order No OO-T1-09, Temperature Measurements of Depleted Uranium Using Infrared Heat Gun, Revision 2

3 Vent Container with Non-Sparking Punch

Use non-sparking punch to pierce the container Place the tip of the punch (attached to a 10-foot length of ¾-inch diameter steel pipe) on the exposed vertical surface of container beneath the rim of the container lid Rest the punch end of the pipe on the sheet metal barrier, placed adjacent to the south side of the container Standing away from the container at the opposite end of the punch, personnel will firmly tap the end of the pipe with a 2 to 3-pound sledge hammer to pierce the container just beneath the lid Personnel will stand to the side of the pipe, and not behind the pipe, when tapping the pipe with the hammer

4 Measure for Temperature Increase on Container Surface

Measure temperature of the container surface to detect potential temperature increase resulting from oxidation of pyrophoric material Perform temperature measurements continuously for at least two minutes If no temperature increase greater than 10 degrees F above the baseline temperature is observed, then monitor the vent hole for potential combustible gases and VOCs using instrumentation listed in Table 3 1 of the Field Implementation Plan If monitoring results indicate it is safe to do so, expose the south side of container by carefully removing the remaining soil with a shovel Once enough soil has been removed, perform a radiation dose survey using a beta/gamma radiation detector Continuously monitor temperature of the container surface during the soil removal and during the radiation dose survey

If at any time the temperature rises greater than 10 degrees F above the baseline temperature, then immediately cover the entire exposed surface of container with soil or sand using hand shovels Once the container is covered, work will pause

for re-evaluation of proper controls and safeguards Use the Met-L-X fire extinguisher located within the enclosure if needed for fire control

If the radiation survey determines that the container contents have a gamma or beta exposure rate of greater than 5 millirem per hour (mrem/hr) at 30 centimeters, work will temporarily pause to evaluate hazards and controls and the work area will be posted as "Radiation Area " The container will then be field screened for radioactive contamination, volatile organic compounds (VOCs), and combustible gases using instrumentation listed in Table 3 1 of the Field Implementation Plan

5 Expose Entire Container

If the field screening measurements indicate the container is stable, continue to carefully remove soil from around the container with hand shovels to completely expose the container The sheet metal barrier can be removed to expose the bottom of the container Continuously monitor the container surface temperature while removing the soil Enough soil will be left in place level with the bottom of the container This will prevent the container from overturning when it is moved away from the side-wall

Place the soil on plastic sheeting inside the enclosure Screen the soil placed on the plastic for levels of radiological contamination (using a FIDLER) and VOC contamination (using an OVA with PID/FID) as shown on Table 3 1 in the FIP Soil with less than 5,000 cpm on the FIDLER will be returned to the excavation as backfill, following the container removal activities Soil with greater than or equal to 5,000 cpm on the FIDLER will be segregated and placed into an appropriate waste package (e g , the 55-gallon overpack drum or metal B-12 box) Table 3 2 of the FIP summarizes the soil screening decision levels and soil segregation methodology to be used

6 Inspect Container for Integrity and Weight

Once the container is sufficiently exposed on all sides, visually inspect the container to evaluate its physical condition If the container appears to be intact, use a shovel to assess if the container can be manually moved from its location Place the shovel blade just beneath the rim of the lid and push on the container to determine if the container is too heavy to move by hand

7 Remove Container, Sample and Package Container

Note that when the container was initially discovered, a portion of the rim of the lid was exposed The lid appeared to be a typical paint can lid with "crimp" metal tabs for fastening It is likely that the lid will be removed by loosening the tabs by hand with a screwdriver or pliers, once the container has been vented and determined to be safe to handle

For each of the applicable cases described below, following removal of the lid the container contents will be visually inspected If the contents are identifiable as the same type of material encountered in Trench 1, sampling and analysis will not be required The container will be transferred into the 55-gallon overpack drum and inerted with soil as described below If the material cannot be identified, then sampling will be performed as described in Section 3 4 of the FIP

If the container is not easily moved, it will be opened and, if required, sampled in-place Following sampling, the container will be transferred from the side-wall directly into a 55-gallon overpack drum as described below

If it is possible to move the container manually, the container will be moved away from the side-wall by hand before opening and sampling Following sampling, if required, the container will be wrapped in plastic sheeting The plastic will be taped and the container will be placed in a 55-gallon overpack drum The overpack drum will be positioned on its side adjacent to the container, on plastic sheeting, with the open end toward the container Once the overpack drum is positioned and secured, personnel will slide the container into the drum by hand The overpack drum will then be up-righted and soil will be added to the drum to completely cover the container and its contents for inerting purposes The overpack drum lid will then be secured

If the container does not appear to be intact and the temperature measurements indicate the container contents are stable, it will be opened and sampled in-place (if required) Following sampling, the container/contents will be transferred from the side-wall directly into a 55-gallon overpack drum using hand shovels Temperature measurements on the non-intact container will be made during the transfer The overpack drum will be positioned on its side adjacent to the non-intact container, on plastic sheeting, with the open end toward the container Once the overpack drum is positioned and secured, personnel will slide the container into the drum by hand If material spills from the container during transfer, it will be picked up with hand shovels in a controlled manner and placed into the overpack drum (while the drum is on its side)

Once the non-intact container/contents have been transferred into the drum, the drum will be up-righted Soil will then be added to the overpack drum to completely cover and inert the non-intact container/contents The overpack drum lid will then be secured

APPENDIX D

Project Phone List

Project Phone List

Name	Company/Title	Phone	Pager	Radio	Home
Aldridge Steve	RMRS - Health and Safety Specialist	2787	508-2137	3719	[redacted]
Burmeister, Mark	RMRS – Technical Lead	5891	212-6228	3750	[redacted]
Casteneda, Norma	DOE - ER Projects	4226	888-290-9018	-	[redacted]
Cygnarowicz, Robert	RMRS - Project Support	7916	-	-	[redacted]
DiGregorio,Greg	RMRS - Quality Assurance	5688	212-6206	-	[redacted]
Estabrooks Bates	RMRS - Radiological Engineer	3769	212-6469	-	[redacted]
Greengard, Tom	KH - Program Manager	5635	212-1968	-	[redacted]
Griffis, Bob	RMRS – Project Manager	4934	212-6505	3700	[redacted]
Guild, Randy	Dyncorp - Contractor Yard	5302	-	3811	[redacted]
McManigle, Aaron	Radian, Air Quality	7240	212-3134	-	[redacted]
Kirar John	RMRS - Nuclear Safety	7844	-	-	[redacted]
Law, John	RMRS - Director, Environmental Rest	4842	-	-	[redacted]
Lenarcic, Ken	KH - Transportation	2377	-	-	[redacted]
Lindsey, Tom	RMRS - Project Support	5705	212-5681	3757	[redacted]
Luker, Steve	RMRS - Quality Assurance	7291	-	-	[redacted]
Martin Lewis, Sally	RMRS - Technical Support	6643	7333	-	[redacted]
Mobley, Steve	KH - Excavation Specialist	2538	212-5502	4508	[redacted]
Omberg, Susan	RFETS Fire Protection Engineering	6294	-	-	[redacted]
Parker, Timothy	Rocky Flats Fire Department - Fire Chief	6043	-	2001	[redacted]
Parson, Gary	KH - Excavation Specialist	4197	212-5508	4561	[redacted]
Pepping, Mike	RMRS - Waste Generator	3075	212-6331	3808	[redacted]
Salomon, Hopi	RMRS - Sample/Waste Manager	6627	212-6224	3779	[redacted]
Sawyer, Chip	RMRS - Radiological Safety Technical Manager	2397	212-3836	3271	[redacted]
Spence, Tracey	RMRS - Field Supervisor	4322	212-6575	3732	[redacted]
Watson, Bruce	RMRS - Radiation Control Compliance	2627	7513	-	[redacted]

APPENDIX E

Task-Specific Activity Hazard Analysis
For the
Removal of the Discovered Two-to Five-Gallon
Container at Trench 1 (IHSS 108)

TRENCH 1 SOURCE REMOVAL PROJECT

REMOVAL OF THE DISCOVERED CONTAINER AT TRENCH 1 (IHSS 108)

Activity Hazard Analysis

1-21-99

NOTE This Activity Hazard Analysis is to be used in conjunction with "Trench 1 Source Removal Project General Project Hazards" Activity Hazard Analysis presented in the Site-Specific Health and Safety Plan for the Source Removal at Trench 1 Site, IHSS 108, RF/RMRS-97-010

Activity	Hazard	Preventative Measures
Construction and demoblization of the enclosure around the container location	Collapse of the enclosure structure	Experienced trades personnel will construct the enclosure with the assistance of Engineering and RCT personnel The enclosure will be constructed of light weight material such as PVC tubing and clear visqueen
	Personnel falling into the excavation	Since the excavation is less than 4 feet deep fall protection is not required, so limiting exposure to falling hazard is necessary Brief personnel on being careful when working near the edge of the excavation
	Fire	The enclosure will be constructed of noncombustible or fire retardent materials in accordance with HSP-34 09 "Plastic House Fire Protection"
Venting the container prior to removal from the excavation wall	Pressurized container	The container will be pierced with a non-sparking tool attached to an 8 to 10 foot length of pipe

Activity	Hazard	Preventative Measures
Venting the container prior to removal from the excavation wall (Continued)	Pressurized container	Personnel will only expose the upper portion of the container prior to venting, allowing the soil surrounding the container to help prevent an uncontrolled pressure release Personnel will rest the non-sparking tool on the top edge of the retaining wall, place the tool against the upper portion of the container, stand back at the opposite end of the tool off to one side, and use a small sledge hammer to tap the end to pierce the container in a controlled manner
	Fire	Inside the enclosure sand and soil will be used for suppression of fires that involve DU or unknown metal materials Met-L-X Fire Extinguishers will also be available to use as a last resort for unknown metal type fires, because Met-L-X may react adversly with some radioactive material ABC Fire Extinguishers will not be used for metal type fires, they should be utilized for any fires that involve the enclosure or other objects HSS will conduct continuous heat test measurement on containers using a hand held infrared thermometer Combustable material will be kept away from the container area

Activity	Hazard	Preventative Measures
Excavation of the container by hand	Personnel being struck in the legs by falling rocks or soil	Personnel will remove the soil from above and around the container in a safe and controlled manner The proper tools will be used and the tools will be in good condition A sheet steel retaining wall has been installed in front of the container to control the collapse of the soil
	Fire	Inside the enclosure sand and soil will be used for suppression of fires that involve DU or unknown metal materials Met-L-X Fire Extinguishers will also be available to use as a last resort for unknown metal type fires, because Met-L-X may react adversly with some radioactive material ABC Fire Extinguishers will not be used for metal type fires, they should only be utilized for any fires that involve the enclosure or other objects HSS will conduct continuous heat test measurement on containers using a hand held infrared thermometer Combustable material will be kept away from the container area

Activity	Hazard	Preventative Measures
Personnel handling the container manually	Back injury or spread of contamination	While personnel are excavating the container and prior to moving the container, personnel will evaluate the physcial condition of the container to determine if it can be moved easily without back injury or without spread of contamination If the container is to heavy to lift safely and/or is in poor physcial condition, a 55 gallon overpack container will be layed down and secured with the open end toward the container, so the container can be slid into the overpack by hand or with shovels Once the container is in the overpack, personnel will stand up the overpack in a safe and controlled manner Contaminated soil will be placed on plastic sheeting or in plastic bags to control spread of contamination
Sampling the contents of the container	Spread of contamination	Prior to opening the container plastic sheeting or a plastic bag will be placed underneath and/or around the container to contain potential contamination while sampling the contents Personnel will conduct the sampling under the direction of the T-1 Sample Manager and in accordance with the Sampling and Analysis Plan (SAP)
Use of breathing air supply trailer to trans-fill the MSA Quickfill SCBAs	Improper use of breathing air system	Personnel will be trained in the use and operation of the breathing air system
	Loss of air supply to the workers in SCBA	A trained person will continuously monitor the air supply system, while workers are in Level-B Respiratory Protection.

Approved·	Signature	Date
RMRS Project Manager-Bob Griffis	R L Griffis	1/26/99
RMRS H&S Supervisor-Anthony Medina	[signature]	1/26/99
RMRS Radiological Engineer-Bates Estabrook	[signature]	1/26/99
K-H Fire Protection Engineering	[signature]	1/26/99

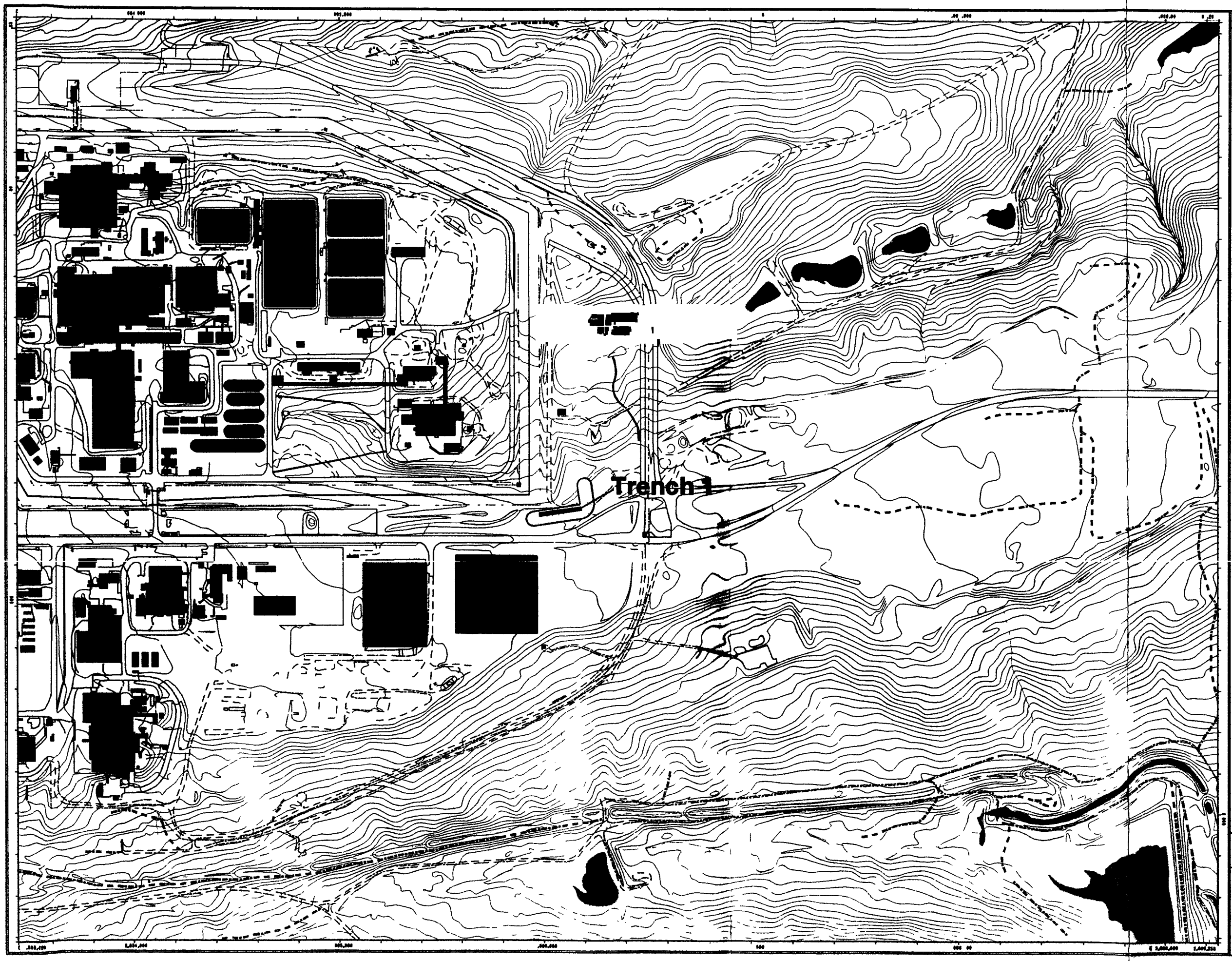


Figure 1 1

Trench 1
Site Location

EXPLANATION

- Contours (5 Interval)
- Trench 1 Tent
- Trench 1

Standard Map Features

- Buildings and other structures
- Lakes and ponds
- Streams, ditches, or other drainage features
- Fences
- Paved roads
- Dirt roads

DATA SOURCE:
Buildings, fences, hydrography, roads and other structures from 1993 aerial photography captured by EG&G Inc., Las Vegas.
Digitized from the orthophotographs, 1995

Scale 1 5430
1 Inch represents approximately 453 feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S Department of Energy
Rocky Flats Environmental Technology Site

Prepared by:
RMRS Rocky Mountain Remediation Services, L.L.C.
Geographic Information System Group
Rocky Flats Environmental Technology Site
P.O. Box 464
Golden, CO 80402-0464

MAP ID: 97-0088

January 15, 1998